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ENVIRONMENTALLY SOUND MANAGEMENT OF WASTE, PARTICULARLY HAZARDOUS WASTES, AND OF TOXIC CHEMICALS, AS WELL AS PREVENTION OF ILLEGAL INTERNATIONAL TRAFFIC IN TOXIC AND DANGEROUS PRODUCTS AND WASTES:

ENVIRONMENTALLY SOUND MANAGEMENT OF WASTES, PARTICULARLY HAZARDOUS WASTES

Progress Report of the Secretary-General of the Conference

I. INTRODUCTION

1. The Preparatory Committee requested the Secretary-General of the Conference to provide a progress report with recommendations for action, covering a comprehensive range of areas, for the environmentally sound management of wastes, particularly hazardous wastes.

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2. In preparing this progress report, the Secretary-General was drawn in particular upon the views expressed at the First Session of the Preparatory Committee and upon the expertise available in the United Nations Environment Programme and all relevant bodies, and took into account all relevant paragraphs of General Assembly Decision 44/228.

3. The progress report is in three parts, dealing with hazardous wastes, solid waste and sewage and radio-active wastes.

The Status of the Basel Convention on the Transboundary Movement of Hazardous Wastes and their disposal and the Code of Practice on the International Transboundary Movement of Radio-active Waste are also reviewed and included in the relevant parts of the report. The principles that have emerged and policy components for integrated strategies for environmentally sound management of hazardous and solid and sewage wastes are proposed for the consideration of the Preparatory Committee.

Measures that could be considered to strengthen and expand the Code of Practice and Guidelines of the International Atomic Energy Agency will be reported later, in light of the enquiries and follow-up being conducted by the Director-General of the IAEA.

4. The Secretary-General of the Conference received very useful cooperation from relevant organizations, in particular the United Nations Environment Programme, the Interim Secretariat for the Basel Convention, the International Atomic Energy Agency; the World Health Organization; the United Nations Industrial Development Organization; the Organization for Economic Development Cooperation and the Council for Mutual Economic Assistance. Non-governmental organizations, academic and research establishments also provided useful information.

The Secretary-General of the Conference also benefitted from the advice and assistance provided by members of the informal *ad hoc* Working Party on Hazardous Wastes.

II. ENVIRONMENTALLY SOUND MANAGEMENT OF WASTES, PARTICULARLY HAZARDOUS WASTES

5. The need for an international strategy was recognized by the Preparatory Committee due to the inevitable generation of wastes in developmental activities. Wastes, when not recycled and reused, on account of economic and technical factors, are valueless and become a negative asset. In addition, wastes, when improperly managed and disposed, affect the quality of the environment, and may pose threats to human health and the ecosystem. Both situations add additional costs to the development process and diminish the benefits, particularly the societal benefits that should have accrued.

6. Clearly, there is a need to uncouple the traditional direct relationship between the quantity and hazardous qualities of wastes generated with that of development, so that resource use will be maximized and environmental impacts minimized.

A. ENVIRONMENTALLY SOUND MANAGEMENT OF HAZARDOUS WASTES

II (i) Review of Current International Activities on Hazardous Waste Management

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

7. As of January 1991, 35 countries and the European Community have signed the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and seven have ratified the Convention. 20 more countries have informed the United Nations Environment Programme that they are in the process of ratification or accession.

8. The Convention shall enter into force 90 days from the date of deposit of ratification or accession by its 20th Member. Eight resolutions were adopted by the conference of Plenipotentiaries at Basel (March 1989) to facilitate the operation of the Convention once it enters into force. As of 22 March 1990, the Convention was closed for signatures, and from which date the Convention is open for accession. The Executive Director of UNEP, in November 1989, established the Interim Secretariat for the Basel Convention (ISBC) which will carry out the functions until the first meeting of the Conference of the parties.

9. Some of the main tasks of the Interim Secretariat are promotion for entry into force of the Convention and information dissemination. A brochure explaining the Convention and its provisions was prepared by UNEP and widely distributed. The Interim Secretariat staff provide briefings on the status of the Convention to a large number of experts, delegates and officials.

With regard to the eight resolutions adopted by the Conference of the Plenipotentiaries,some of the activities which have been undertaken by UNEP are:

- All Member States of the United Nations were approached, requesting their views on the mechanisms for the implementation of the Convention and a request was also made to those who have not yet signed the convention to do so.

- Consultations, studies and reviews for harmonization of the rules and regulations regarding dumping of hazardous wastes and other wastes with provisions contained in the London Dumping Convention. A resolution adopted at a consultative meeting of the Contracting Parties to the London Dumping Convention stated that standards comparable to those imposed by the Basel Convention should be developed and presented to the next consultative meeting of the Parties.

- Establishment and holding of a first meeting of an *ad hoc* Working Group of Legal and Technical Experts for the development of elements which might be included into a protocol on liability and compensation for damage resulting from transboundary movement and disposal of hazardous and other wastes.

- Harmonization of procedures between the Basel Convention and the Code of Practice for the International Transboundary Movement of Radioactive Waste, adopted by the General Conference of IAEA last year, has been undertaken.

- Continuing efforts to obtain funds for the work of the ISBC for which, so far, only 14 countries have paid contributions.

- Drafting of a report on additional measures needed to complement existing rules, regulations and practices with respect to transport of hazardous wastes by sea in the light of the Basel Convention.

- Preparation of draft technical guidelines to promote environmentally sound management of wastes within the context of the Basel Convention.

- Finalization of a draft model legislation for the control of transboundary movements of hazardous wastes and other wastes and their disposal. This is now available to countries.

- Facilitating technical cooperation in hazardous wastes management, particularly for developing countries.

10. UNEP, through its Industry and Environment Office and Regional Offices have organized a series of regional training workshops to assist countries to develop national capabilities to manage hazardous wastes within the framework of the Convention.

Fourth ACP-EEC Convention

11. The Fourth Convention signed in Lome, Togo on 15 December 1989, Title I "Environment" Article 39 stated *inter alia* that:

- The Contracting Parties undertake, for their part, to make every effort to ensure that international movements of hazardous waste and radioactive waste are generally controlled implying that the Community prohibit all direct or indirect export of such waste to the ACP States and the ACP States prohibit the direct or indirect import into their territory of such waste from the Community or from any other country, without prejudice to specific international undertakings to which the Contracting Parties have subscribed or may subscribe in the future in these two areas within the competent international fora.

- The Contracting Parties shall expedite adoption of the necessary internal legislation and administrative regulations to implement this undertaking.

- The Parties undertake to monitor strictly the implementation of the prohibition measures referred to in this article.

- The term "hazardous waste" within the meaning of this Article shall cover categories of products listed in Annexes 1 and 2 to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

12. As regards radioactive waste, the applicable definitions and thresholds shall be those specified in the declaration in Annex VIII to this Convention.

World Health Organization

13. The World Health Assembly in its 43rd session in May 1990 reviewed the issue of hazardous wastes, particularly with regard to the health risks involved and the transfer of hazardous wastes to the developing countries. To date, WHO activities in the area of hazardous wastes have ranged from assessment of their health risks, provision of guidelines and the strengthening of national capabilities. In its resolution the Assembly emphasized the health concerns involved and urged Member States, *inter alia*, to establish and strengthen their programmes, to extend health surveillance systems to identify in a timely fashion the adverse effects on health surveillance systems to identify in a timely fashion the adverse effects on health from exposure to hazardous wastes and to accede to and ratify the Basel Convention. The Assembly further requested WHO

to support Member States in carrying out their programmes, to develop improved health-based criteria, and to facilitate the dissemination of technical and scientific information dealing with various health aspects of hazardous wastes.

Organization for Economic Cooperation and Development

14. At its 32nd meeting in October 1990, the Waste Management Policy Group finalized the text of a draft Council Decision-Recommendation on the Reduction of Transfrontier Movements of Wastes. The objective is that OECD Member countries take steps to implement the principles contained in the Basel Convention of 22 March 1989, even before the Convention enters into force. The proposed text separates clearly the wastes intended for "final" disposal, for which the principle of national self-sufficiency is advocated, from those to be subjected to recycling operations, for which the draft Decision-recommendation foresees a programme of activities possibly leading to appropriate control of their transfrontier movements within the framework of the Basel Convention while ensuring the promotion of resource and material recovery.

15. The draft Council Decision-Recommendation to be included in the documentation for the Meeting of the Environment Committee at Ministerial level, include an instruction to the Environment Committee to develop and implement a programme of activities concerning wastes destined for operations leading to resource recovery, recycling, reclamation, direct re-use or alternative uses. This programme should in particular:

(a) Clarify the definition of wastes and characterize those wastes which may require differing levels of control;
(b) Identify and assess environmentally sound and economically efficient practices for recovery operations;
(c) Develop means to appropriately determine quantities of wastes subjected to recovery operations as compared to those finally disposed;
(d) Establish the current and potential role of the uses of wastes in substituting for primary raw materials and in preserving natural resources;
(e) Delineate appropriate controls for transfrontier movements of wastes destined for recovery operations;
(f) After assessment of the results of elements (a) through (e), if appropriate, develop the basis of a multilateral agreement pursuant to Article 11 of the Basel Convention which would govern transfrontier movements of these wastes exclusively among Member countries.

Organization of the African Unity

16. The implementation of CM/Res.1292(L) on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in Africa is an on-going exercise.

17. At the 51st Session of Council, CM/Res.1260 called upon the Secretary-General of the Organization of African Unity, to:

"maintain the momentum for the implementation of CM/Res.1225(L) by convening, as soon as possible, a second experts group meeting to finalize the draft African convention on the Control of Transboundary Movements of Hazardous Wastes in the continent so that it should be ready for submission to the Pan-African Coordinating Conference on Environment and Sustainable Development in Bamako, Mali in June 1990"

18. At the 52nd Ordinary Session of the Council the meeting proposed that the Convention be titled *"The African Convention on the Ban and Import of All Forms of Hazardous Wastes into Africa and the Control of Transboundary Movements of Such Wastes Generating in Africa".*

19. The General Secretariat of the OAU on 3 September 1990 circulated to all its Member States the Report and Text of the Second Meeting of Legal and Technical Environmental Exerts to Draft the African Convention.

International Non-governmental Activities

20. An increasing number of international non-governmental organizations are being established to promote the environmentally sound management of hazardous wastes. One example is the Pacific Basin Consortium for Hazardous Waste Research, a non-governmental consortium established in 1986. The Consortium gives a good example of collaboration amongst over 70 governments, industry, research and academic institutions from 18 developed and developing countries in the Pacific Basin, to carry out research, education and training in the environmentally sound management of hazardous wastes. The Secretariat is located at the East West Center in Honolulu, Hawaii, USA. The purpose of the Consortium is to address the special needs of the Pacific area with respect to hazardous waste. Its objectives are to identify and assess hazardous waste management problems common to the Pacific basin, to promote research, engineering, and demonstration of hazardous waste technologies, to establish effective methods for exchanging information and transferring technology, and to provide training opportunities for technical personnel.

21. The International Solid Wastes and Public Cleansing Association (ISWA) was set up in 1970 to provide a forum to address international problems of hazardous waste management. ISWA is currently focusing attention on the following issues; hazardous waste management in developing countries; household hazardous wastes and waste minimization; safe practices of hazardous wastes; management techniques for abandoned sites and specific hazardous wastes; and transportation and collection of hazardous wastes. The agenda over the next two years includes a series of technical working group meetings. "ISWA Times", published bi-monthly, is sent to members in over 60 countries.

II (ii) Principles and Policies for Developing an International Strategy for Environmentally Sound Management of Hazardous Waste

22. There are a number of principles that have emerged and increasingly put into practice in the environmentally sound management of wastes. These include:

- Preventing the formation of wastes, particularly hazardous wastes by the adoption of cleaner production techniques, recycling, residue utilization and use of substances that are less toxic and less prone to forming hazardous wastes.
- Reducing the generation of wastes at their source.
- Converting waste to recyclable or reusable materials and energy.
- Treatment, destruction and disposal of wastes at or as near to the generating source as possible. This "proximity principle" is particularly important for hazardous and radioactive wastes, to minimize accidents in connection with handling and transportation.
- Strengthening "self-sufficiency" capabilities at the national level to manage wastes.
- Reducing transboundary movement of hazardous wastes to a minimum consistent with the environmentally sound management of those wastes.

Policy Objectives and Goals

23. The Preparatory Committee may wish to consider the following main general objectives of the International Strategy which would provide a framework for:

(i) promoting international co-operation amongst governments, industry, non-governmental organizations and the public,
(ii) harmonizing international and national procedures,
(iii) managing hazardous waste in a way that human health and the environment will be protected while contributing to cleaner production and sustainable forms of development,
(iv) recommending appropriate regulations and incentives to achieve the objectives of the strategy,
(v) developing information exchange mechanisms, and technology transfer to developing countries to support a comprehensive and integrated strategy,
(vi) identifying the necessary educational, managerial, financial and institutional requirements for the implementation of the strategy,
(vii) improving knowledge regarding the effects of hazardous wastes on health and the environment,
(viii) establishing linkages with international and national strategies for the environmentally sound management of toxic chemicals.

24. The strategy should include proposals for the international classification of hazardous waste, recommendations for the establishment of international environmental and management procedures related to the entire cycle of hazardous waste, that is from generation, storage, transportation, recycling, reuse, disposal, treatment to final destruction.

II (iii) Main Environment and Development Issues for Consideration

Role of Industry, Industrial Hazardous Waste Generating and the Economy

25. The procedures for assessing the economic and societal benefits, and the need to internalize the costs of hazardous wastes management as well as consequences of hazardous waste regulations on international trade should be elaborated. The role of such regulations in promoting research and development of technologies and fostering waste treatment and abatement industry should also be examined.

Environmental and Health Impacts Associated with Hazardous Wastes

26. The composition, characteristics and properties of hazardous wastes can often change, accelerated by chemical reactions of the wastes constituents during storage, transportation as well as in land filled sites if wastes are mixed for disposal. The impacts on the environment and human health are difficult to access. This section of the strategy should provide an overview of the current state of knowledge, the gaps that exist, and the monitoring, surveillance, assessment and research needs required to provide a better information base for formulating management policies and strategies. The linkages with protection of land and fresh water resources, improved coastal zone management, conservation of biological diversity, and with living and working conditions need to be particularly examined.

27. Some of the major issues that will be addressed are:

(i) Effects on the environment.

Hazardous wastes can significantly modify the quality of the environment, imposing risks on plant and animal populations and their habitats. Human health and well-being can as a result be affected. The impacts on water and land resources, estuaries and coastal zones and biological diversity and how these will constrain developmental activities should be examined.

(ii) Effects on human health.

Epidemiological and toxicological studies have examined the effects of hazardous wastes on human health and well-being. The risks posed by hazardous wastes from industry and agriculture activities as well as in the homes will be discussed. Epidemiological and toxicology studies, needed

to identify adverse effects on populations of exposure (actual or potential) to hazardous wastes, should be identified.

(iii) Hazardous wastes in the work place.

Workers are particularly vulnerable as they are the first group of people to come into contact with hazardous wastes. Occupational health priority areas, criteria for protecting workers' health, accident prevention and safety measures will be reviewed.

(iv) Effects of abandoned hazardous wastes sites.

One of the major problems in managing hazardous wastes is with abandoned sites that were not properly secured, hence posing risks to human health and the environment. The need for carrying out an inventory of all sites, monitoring technical measures and regulations to secure the sites will be discussed.

Technologies for Hazardous Waste Management

28. Technologies for safe generation, storage, transportation, treatment, disposal, destruction, recycling, should be critically reviewed. The costs involved should also be presented. Sources of information, modalities and mechanisms for access, transfer and cooperation need to be provided. Special emphasis should be placed on hazardous wastes prevention and reduction technologies, as well as the potentials for promoting the substitution of present manufacturing processes and products with alternatives that would not generate hazardous wastes.

Criteria for the Classification of Hazardous Waste

29. To enhance international cooperation and monitoring on transboundary movement of hazardous wastes, there is a need for internationally accepted criteria that would identify and classify hazardous wastes which should also help the development of national legal instruments as well as promote compatibility between national and international efforts.

30. The three annexes to the Basel Convention, when ratified, will provide a good basis for an internationally accepted classification of hazardous wastes.

International Remedial and Response Activities for Environmentally Sound Management of Hazardous Wastes

31. There are numerous international legal and voluntary instruments which regulate the generation, use, re-use, transport, and disposal of hazardous waste. Some of these instruments, however, are not fully implemented since they lack appropriate enforcement mechanisms and adequate institutional, technical, financial and managerial support.

32. The work of the Interim Secretariat for the Basel Convention (ISBC) and other regional initiatives on hazardous waste management should be updated with recommendations on how it could be strengthened, taking into account the need for environmentally sound and sustainable forms of development.

Regulations for Hazardous Wastes Management

33. A number of legal instruments are used to regulate and control hazardous wastes which need to be analysed in order to identify gaps and possibilities for harmonization and it should be considered how assistance could be provided to developing countries in this respect. These include:

- Registration and post-registration procedures and surveillance mechanisms: e.g. licenses and permits.
- Classification of hazardous wastes.
- Production and consumption patterns in generating hazardous waste.
- Anticipatory and preventive policies.
- Re-use and recycling of hazardous waste.
- Transfrontier movements of hazardous waste.
- Prior notification and information exchange.
- Safety and contingency planning.
- Procedures for receiving, storing and treating hazardous wastes.
- Approved sites and facilities and environmentally sound receiving facilities for hazardous wastes.

B. ENVIRONMENTALLY SOUND MANAGEMENT OF SOLID WASTE AND SEWAGE RELATED ISSUES

I (i) General Policy Objectives

34. The collection, treatment and disposal of solid wastes and sewage are becoming increasingly difficult and expensive. This is exacerbated with urbanization and the growth in megacities. It is expected that by the year 2000 there will be about 60 cities in the world, each with a population of four million inhabitants or more and the majority of these will be in developing countries.

35. The scope of the problem is clear. In the developed countries about 0,6 to 1 Kg. of refuse is produced daily by the inhabitants. Most of this quantity is collected. In the developing countries the generation rate is 0,2 to 0,4 Kg. and only about 20 per cent is collected. With increasing population, the quantity of solid waste generated will also increase accordingly, posing greater difficulties for collection and disposal. The plight of a ship carrying solid waste, but could not get permission to dock, highlights the problems that have emerged.

36. Uncollected and untreated solid waste and sewage pose significant public health

problems, undermining the health and the well-being of the people, decreasing their productivity and constraining the development goals and aspirations of the individual and hence the country. The composition of household refuse depends on the lifestyles and standards of living of the inhabitants and the degree of industrialization. The proportion of organic materials from food preparation is higher in the wastes of developing countries, while the quantity of materials such as paper, metals and glass is lower in the composition of refuse of industrialized countries as these are reclaimed before the refuse is turned into waste. Hence, different management strategies need to be formulated to meet the particular prevailing constraints in a country.

37. The requirements for proper collection, handling and disposal of solid waste and sewage is increasingly difficult to achieve and are taxing technical, financial and infrastructural capacities of authorities, particularly in developing countries. Refuse collection and disposal is a public service and, therefore, a non-revenue generating operation. Investments in this sector of urban administration are considered as lost and have to compete, often at lower priorities, with the funding of infrastructural and industrial projects in the productive sectors. As a consequence, the services in the urban areas are very often inadequate and seldom exist in most rural areas of developing countries.

38. Some of the problems faced by developing countries in solid waste management are:

- Lack of qualified technical and supervisory personnel;
- inadequate pay and low social status of the personnel;
- increases in unplanned human settlements, which often create slum areas;
- difficulties in the maintenance of equipment for efficient operation due to lack of spare parts;
- heterogenous equipment and vehicle fleets aggravated by a lack of roads or poor road conditions and traffic congestions resulting in inefficient and costly collection of refuse;
- inadequate land use planning and zoning as well as weak enforcement regulations; and,
- lack of integration of solid waste and sewage management in urban and rural development plans.

I (ii) Main Environment and Development Issues for Consideration

Health and Environment

39. The effects of inadequate collection and disposal of refuse on public health and the environment are many. In general, municipal refuse collection and disposal has two objectives from the public health point of view:

- to eliminate or minimize direct infection and prevent epidemics; and,

- to create a clean sanitary environment.

40. With irregular collection services, the refuse may stay for extended periods at the point of disposal. In hot climate the wastes decompose rapidly crating breeding grounds for all types of vectors and pathogenic organisms and the subsequent spread of diseases. In addition to the disease transmitting sectors, there is often the problem of odour and aesthetics. Furthermore, air pollution is worsened by smoke generated from smoldering heaps of refuse and the wind can carry enormous quantities of particles from the refuse piles. Secondary health effects can also occur due to inadequate treatment and ineffective ultimate disposal of waste, which may harm ground water quality.

41. The siting of landfills and dumping areas is, therefore, particularly important in order to avoid floodplains, for example, or similar places where water table could have contacts with the sites. In addition, the surrounding areas of a landfill can be contaminated when inundated from flooding following heavy rainfalls and cause serious damage to flora and fauna.

42. The incineration of municipal solid waste could result in air pollution emissions if adequate control and abatement measures are not incorporated. In addition disposal of ashes and slags from the incinerating process could cause ground water contamination. If the ashes contain heavy metals, the potential effects on human health become more serious.

43. Disposal of garbage from coastal zones could damage aquatic life, due to the organic loading and toxic substances contained in the waste. As coastal zones are very rich ecological areas, contamination would have serious implications on biological diversity.

Waste Generation and Collection

44. One of the first priorities in waste management is to reduce the generation of waste at its source by encouraging changes in lifestyle and less profligate use of resources. This would reduce the amount of waste for treatment and disposal resulting in considerable cost savings.

45. While technology and organization for collection and transportation of the refuse has been, to a large extent, dealt with in the industrialized regions, this aspect needs strengthening and expansion in developing countries. There is, hence, a need to look for more cost-effective ways to deal with this, optimizing the transport systems.

46. The mechanization of the collection process is a major constraint in the developing countries, as this would require specially equipped vehicles and foreign exchange to purchase the equipment. The use of non-mechanized modes, such as handcarts and horse drawn carts are widely used in developing countries as other means to handle the collection and disposal needs. Such modes should be integrated into the

overall logistics of collection and transportation, providing a less costly alternative for those countries.

Technologies and Methodologies for Treatment and Disposal

47. Most industrialized countries have a lack of available space for sanitary landfills within city boundaries. Consequently, methods such as incineration and composting are used to reduce the volume of solid wastes.

48. However, refuse incineration is costly and a technically complicated process. Energy recovery is increasingly incorporated, which could improve the economics of the process. Composting has a greater potential, particularly in developing countries, because of the high organic content of the solid waste and agricultural needs. The composting option would become more viable, if marketing and distribution of the compost were also included in the overall scheme. The generation of biogas by anaerobic digestion is another use of the wastes, which have applications in many countries with particular potentials for rural development.

49. While manual sorting out of recyclable materials such as metals, paper and glass has been practiced for a long time, both in industrialized as well as developing countries. Recycling plants to mechanize the process are increasingly used. Sorting and segregation should be encouraged in households as well as in business and industry in order to reduce scavenging and the subsequent health hazards.

C. POTENTIAL AREAS FOR ACTION

50. The Preparatory Committee may wish to consider the following potential areas for action to promote an international strategy for environmentally sound management of wastes, particularly hazardous wastes. The components for the strategy, which would build upon and strengthen existing activities, are:

Waste Prevention and Minimization

51. There is a need for an integrated policy of technical measures, financial/economic incentives, and regulations designed to encourage and facilitate waste prevention and minimization in the home, agriculture, industry, by the adoption of recycling, residues utilization, cleaner production schemes. Such an integrated policy package should be developed for closing the waste cycle.

Economics of Waste Management

52. To ensure that the environmentally sound management of wastes, will also promote sustainable forms of development, this programme would require information on the economics of waste management would be required. This component should include:

- Developing guidelines for estimating the costs and benefits for various approaches to waste minimization and environmentally sound management of wastes.
- Analyzing, synthesizing and disseminating relevant information on the experiences that countries have had in adopting economic regulatory schemes (eg, pollution fees, taxes), as well as economic incentive mechanisms (subsidies, loans) for waste management.
- Estimating costs of cleaner production systems.
- Examining and proposing mechanisms for making available more financial assistance to developing countries to meet the needs for cleaner production and waste minimization.

Education, Training, Research, Capacity Building

53. Human resources development is crucial to ensure that trained expertise will be available to design, undertake research, develop national capabilities, build, operate and maintain facilities for waste prevention and minimization, particularly hazardous wastes. Expertise is also needed to help strengthen institutional mechanisms and develop, implement and enforce environmental laws and legislations for compliance with national and international requirements. The component should include:

- Assessing specific needs, particularly in developing countries, for developing national capabilities for environmentally sound management of wastes, particularly hazardous wastes.
- Developing curricula and training materials on environmentally sound management of wastes, particularly hazardous wastes, for integration into formal and non-formal education and training systems.
- Promoting research, including local research, for waste minimization, detoxification, treatment and disposal.
- Fostering the establishment of research networks for the exchange of information and experience.
- Strengthening national capacities for monitoring and compliance of regulations, implementation of international and/or regional conventions/agreements, for example the Basel Convention.

Environmental and Health Impacts of Wastes

54. This component should include:

- Developing a mechanism for compiling and disseminating information on the effects of wastes on the environment, human health and well-being.
- Identifying and elaborating the linkages of wastes, particularly hazardous wastes effect on freshwater, costal zones, land and biological diversity as well as policy and institutional implications and the response options available.

- Developing procedures and methodologies for assessing impacts of wastes as well as risks posed by wastes.

Waste Treatment Centres

55. The potentials for establishing a network of centres at the national, sub-regional, regional levels, as appropriate, for waste treatment and the corresponding technical, logistical, financial and regulatory requirements should be studied to provide the guidance that would be needed.

Harmonization of Criteria

56. This component should endeavour to promote the harmonization of procedures/criteria that are used in various international conventions and legal instruments, to strengthen international cooperation in the monitoring of transboundary movements of wastes. These include emergency response systems; liability and compensation schemes; prior notification and information exchange; receiving, storing and treating; site and facility approval criteria; licenses and permits.

Integration of Waste Management, Land Use Planning and Development Plans

57. While an environmentally sound management strategy for wastes would endeavour to close the waste cycle to the practicable extent possible, through technological measures and financial mechanisms, there would still be the need to integrate such a strategy with land use planning and development plans, particularly for solid wastes and sewage. The collation and review of such experiences could be of use to foster an integrated strategy.

Technologies for Recycling and Conversion of Waste

58. There are potentials for recycling and converting wastes into useful materials and energy, for example by composing, incineration pyrolysis and anaerobic digestion. Much work has been done by a wide range of organizations, including universities, research laboratories, non-governmental organizations and industry. Reviews should be undertaken to assess the current state of technologies for recycling and conversion; determine the constraints that are impeding greater recycling and conversion; and recommend actions needed to overcome these constraints.

III. ENVIRONMENTALLY SOUND MANAGEMENT OF RADIOACTIVE WASTE MANAGEMENT

1. For most developing countries, currently nuclear power plants are not the focal point of radioactive waste management activities. Only about 7% of the world's installed nuclear power capacity is in countries from developing areas of the world. Yet nuclear power could become a growing source of radioactive wastes in future as nuclear power units under construction in developing countries become operational.

2. Since nuclear science and technology have important development applications, developing countries are mostly concerned with the management of nuclear wastes generated from medical centres, research institutes, industrial facilities, mining operations, and research reactors.

III (i) Review of Activities of the International Atomic Energy Agency

Technical Cooperation and Assistance

3. The activities of the International Atomic Energy Agency in waste management have therefore laid emphasis on assisting its Member States, through information exchange programmes, training and technical co-operation, by providing assistance in starting and building necessary infrastructures; fellowships and financial support for carrying out research in the nuclear energy field and nuclear applications. Emphasis is placed in helping countries to establish long-term, integrated waste management programmes.

4. The IAEA has recently launched four new programmes[1]. Two of these are especially designed to provide assistance to developing countries; one programme is structured for the needs of industrialized countries, and one programme should be useful to all countries. These programmes are:

5. - Waste Management Advisory Programme (WAMAP): This programme provides assistance in the planning and implementation of national radioactive waste management programmes for developing countries. Its objectives are to provide mechanisms that give international expertise on waste management problems and to develop and implement solutions on a regional basis.

- Waste Management Assessment and Technical Review Programmes (WATRP): This programme provides a mechanism to establish a forum for technical assessments/peer reviews of waste management policies and

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1 **Effects on the Environment of the Dumping of Nuclear Wastes, IAEA, Vienna 1990.**

practices of industrialized countries. Its objective is to assist Member States evaluate their waste management systems, planned or in operation.

- Waste Processing and Storage Facility (WPSF): This facility provides technical assistance so that the basic waste processing and storage needs of Member States without nuclear power plants could be met.

- Waste Management Data Base (WMDB): This database will provide a waste management profile of Member States based on complete information on their radioactive waste management infrastructures. The objective is to enhance the waste management programme by providing ready access to information on Member State's activities in the field.

III (ii) Code of Practice

6. Pursuant to the IAEA General Conference Resolution GC(XXXIV)/RES/530 (1990) and in conformity with UNCED Preparatory Committee Decision I/22 Section I paragraph 2, the Director General of the IAEA on 10 October 1990, made available to the Secretary-General of UNCED, the Code of Practice on the International Transboundary Movement of Radioactive Waste, adopted by the General Conference of the IAEA at its Thirty-Fourth Regular Session in September 1990 as well as technical information on the management and disposal of radioactive wastes[2].

7. The General Conference requested Member States to include the Code's provisions as appropriate in their national legislation and in their bilateral and multilateral co-operation agreements.

8. The General Conference further decided to keep the question of international transboundary movement of radioactive waste under active review, including the desirability of concluding a legally binding instrument under the auspices of the IAEA, and requested the Director-General to monitor and report on the implementation of the Code by Member States.

9. The following Basic Principles contained in the Code of Practice should serve as main guidelines to States for the development and harmonization of policies and laws on the international transboundary movement of radioactive waste:

(i) to ensure that radioactive waste within its territory, or under its jurisdiction or control is safely managed and disposed of, to ensure the protection of human health and the environment;

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2 - **Technical Paper in Support of the Code of Practice on Transboundary Shipments of Radioactive Wastes (April 1989)**
- **Effects on the Environment of Dumping of Nuclear Wastes (1990)**
- **IAEA Bulletins 4/1989**

(ii) to minimize the amount of radioactive waste, taking into account social, environmental, technological and economic considerations;

(iii) to ensure that international transboundary movement is undertaken in a manner consistent with international safety standards;

(iv) to ensure that, subject to the relevant norms of international law, the international transboundary movement of radioactive waste takes place only with the prior notification and consent of the sending, receiving and transit States in accordance with their respective laws and regulations;

(v) every State involved in the international transboundary movement of radioactive waste should have a relevant regulatory authority and adopt appropriate procedures as necessary for the regulation of such movement;

(vi) no receiving State should permit the receipt of radioactive waste for management or disposal unless it has the administrative and technical capacity and regulatory structure to manage and dispose of such waste in a manner consistent with international safety standards. The sending State should satisfy itself in accordance with the receiving State's consent that the above requirement is met prior to the international transboundary movement of radioactive waste;

(vii) every State should take the appropriate steps to introduce into its national laws and regulations relevant provisions as necessary for liability, compensation or other remedies for damage that could arise from the international transboundary movement of radioactive waste;

(viii) appropriate steps, including the adoption of laws and regulations are taken to ensure that the international transboundary movement of radioactive waste is carried out in accordance with this Code;

(ix) the sending State should take the appropriate steps necessary to permit readmission into its territory of any radioactive waste previously transferred from its territory if such transfer is not or cannot be completed in conformity with this Code, unless an alternative safe arrangement can be made;[3]

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3 **The above would not apply to waste which is associated with, or results from, a service provided by the sending State to the receiving State and which is subject to a contractual arrangement between them that such waste be returned to the receiving State.**

III (iii) Follow-up to Strengthen Guidelines and Code of Practice

10. In order to establish the desirability of concluding a legally binding instrument, the Director-General of the IAEA is enquiring with Member States about the present practice of radioactive waste movements, recent laws enacted on this subject and their conformity with the Code of Practice. A report on implementation of the Code of Practice to be prepared for the IAEA General Conference 1991 would be made available to UNCED.

11. This report should provide a basis on how technical cooperation and assistance, particularly to developing countries could be further strengthened to increase and improve the management of radioactive wastes from important research, medical and a vast array of developmental applications, while enhancing the protection of human health and the environment.